Innovative approaches to Emergency and Disaster Medicine Education
Hello!

I am Marta Caviglia
MD, Department of Anesthesiology and Critical Care Researcher in Disaster Medicine and Humanitarian Health, CRIMEDIM
CRIMEDIM is a university-wide academic center that conducts research, education and training in the field of disaster medicine and humanitarian health.

The center is committed to promote innovative research projects and to foster learning and training programs using state-of-the-art technologies to enhance the resilience of health systems in emergency, disaster and humanitarian crisis.
CRIMEDIM

MAIN AREAS OF ACADEMIC EDUCATION AND TRAINING

1. **Disaster Medicine Education and Training for Disaster Managers, Leaders and Policy Makers**
   - European Master in Disaster Medicine (EMDM)
   - PhD in Disaster Education, Disaster Medicine and Humanitarian Health
   - Disaster and humanitarian fellowship

2. **Disaster Medicine Education and Training for Health Professionals**
   - Humanitarian Medic
   - Disaster Medic
   - Hospital Disaster Preparedness
   - Pre-deployment Training for Ebola Emergency Response

3. **Disaster Medicine Education and Training for Medical and Nursing Students**
   - TdMT - Training disaster medicine Trainers
   - DisasterSISM
   - Disaster Medicine module in the standard medical curriculum at the Università del Pleinonte Orientale

4. **Ad Hoc Curriculum and Simulation Based Training Development**
   - Basic and Advanced Modular Courses for Health Professionals
   - Instructor Course and Faculty Development
   - Scenario-Based Training
CRIMEDIM

MAIN AREAS OF RESEARCH

PROFESSIONALIZATION OF HEALTH WORKERS IN DISASTER AND HUMANITARIAN ASSISTANCE

OPERATIONAL RESEARCH IN DISASTER AND HUMANITARIAN SETTINGS

SIMULATION AND EMERGING TECHNOLOGIES IN DISASTER EDUCATION

HOSPITAL DISASTER RESILIENCE
Disaster Medicine

PollEv.com/martacavigli852
A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.

(UNISDR) [2 February 2017]
The effect may test or exceed the capacity of a community or society to cope using its own resources, and therefore may require assistance from external sources, which could include neighbouring jurisdictions, or those at the national or international levels.

(UNISDR) [ 2 February 2017 ]
Emergency is sometimes used interchangeably with the term disaster, as, for example, in the context of biological and technological hazards or health emergencies, which, however, can also relate to hazardous events that do not result in the serious disruption of the functioning of a community or society.
Figure 2: Numbers of disasters and total people reported affected (x 1 million): 1990-2016
Disaster Medicine

RISK = Hazard & Exposure \times \text{Vulnerability} \times \text{Coping Capacity}
Disaster Medicine
Disaster Medicine

**DISASTER MANAGEMENT**
The organization, planning and application of measures preparing for, responding to and recovering from disasters.

UNISDR Terminology

www.preventionweb.net/english/professional/terminology
Disaster Medicine

UNISDR Terminology

Sendai Framework for Disaster Risk Reduction 2015-2030
Documents, tools and processes

www.preventionweb.net/english/professional/terminology
Professionalization of Disaster Medicine—An Appraisal of Criterion-Referenced Qualifications

David A. Bradt, MD, MPH, FACEM, FAFPHM, DTM&H;¹
Christina M. Drummond, MBBS, DObstRCOG, DTM&H, FRACP, MPH, MAE, FAFPHM²

- Disaster Medicine Expert
- Disaster Medicine for Health Care Providers
- Disaster Medicine for Medical Students
Disaster Medicine

“Enhance the resilience of national health systems, including by integrating disaster risk management into primary, secondary and tertiary health care, especially at the local level”

Education and training for a wide spectrum of health care professionals, including medical students, will improve resilience of communities towards disasters
Challenges: state of the art

- lack of awareness and education among communities and medical students
- lack of education and training of the different parties involved in the medical management of disasters
- no explicit inter-agency standards for evaluation of health personnel who respond to disasters

* Perspectives of future physicians on disaster medicine and public health preparedness: challenges of building a capable and sustainable auxiliary medical workforce. Kaiser HE1, Barnett DJ, Hsu EB, Kirsch TD, James JJ, Subbarao I.

* Identifying deficiencies in national and foreign medical team responses through expert opinion surveys: implications for education and training. Djalali Al, Ingrassia PLI, Corte FD
Challenges: state of the art

- high willingness to fill the formative gap and welcome specific training in disaster medicine during medical school
- high interest in participating in future humanitarian deployments
- strong believe that further professionalization within the humanitarian aid sector is required

* Italian medical students and disaster medicine: awareness and formative needs. Ragazzoni L¹, Ingrassia PL², Gugliotta G³, Tengattini M¹, Franc JM⁴, Corte FD⁵.
* Knowledge Levels and Training Needs of Disaster Medicine among Health Professionals, Medical Students, and Local Residents in Shanghai, China. Tong Su, Xue Han, Fei Chen
CRIMEDIM courses

- Disaster Medicine Experts
- Health Care Providers
- Medical Students
TEACH TO HELP

Create a generation of **undergraduate trainers** able to deliver peer-to-peer courses in Disaster Medicine.
TdmT

A Community of Undergraduate Disaster Medicine Trainers

- 20 medical students recruited
- 1 week expert training in CRIMEDIM
- Peer-to-peer training through IFMSA
- 3 months online learning developed by experts

ITDM courses

EXAM
Written and Practical

Peer-Assisted Learning (PAL)

- Comparable to conventional education
- “Cognitive congruence”
- “Social congruence”
TEACH TO HELP

Necessary knowledge, skills and attitudes to proficiently participate to international disaster responses and humanitarian health programs
HumMedic

[ SHARED CORE HUMANITARIAN COMPETENCIES ]

[ SKILL-SPECIFIC COMPETENCIES ADJUSTED FOR RESOURCE POOR SETTINGS ]

HUMANITARIAN HEALTH PROFESSIONAL

CRIMEDIM courses

TEACH TO HELP competencies to contribute to the body of knowledge of disaster medicine and disaster medical management, the ability to conduct independent research and the skills of creative and flexible problem-solver and decision-maker under crisis situations.
Education and research in disaster medicine and management: inextricably bound up with each other
Ives Hublooe^a,b,c and Michel Debacker^a,b,c
CRIMEDIM courses

E-LEARNING

RESIDENTIAL

CERTIFICATE
ADULT Learning

PEDAGOGY
Teacher-focused education

Passive reception

ANDRAGOGY
Learner-focused education

Active inquiry
## ADULT Learning

<table>
<thead>
<tr>
<th>Andragogy</th>
<th>Self-Directed Learning</th>
<th>Experiential Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students bring in their experiences to guide them along the journey of learning</td>
<td>Students take ownership of their learning</td>
<td>The essence of adult learning is making sense of experiences.</td>
</tr>
</tbody>
</table>

- Need for Knowledge
- Motivation
- Willingness
- Experience
- Self direction
- Orientation to learning

- Set their learning goals
- Engage in the learning process (Learning Style)
- Self-reflection and self-evaluation

**Learning Style**

1. Experience: Do something
2. Plan: Bearing in mind your conclusions
3. Reflect: Think about what you did
4. Conceptualise: Make generalisations
ADULT Learning

- Andragogy
- Self-directed learning
- Experiential learning
- Transformational learning
- Neuroscience

- To address perceived learner needs
- Choose instructional strategies in alignment with real learning contexts
- Choose the technology that best supports the instructional strategy
ADULT Learning

- Substantial experience
- Immediately useful
- Decide for themselves
- Need to validate
- Resource for teacher and fellow learners
ADULT Learning

- Involve participants
- Serve as facilitator
- Recognize and respect their expertise
- Encourage to share experiences
- Explain training objectives
“Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand.“
Confucio
ADULT Learning

- Learn By Doing
- Simulation
Simulations

- Learn By Doing
- Simulation
- Automatic Actions
Simulations

Emotions
- Anger
- Sadness
- Anxiety
- Fear
- Sadness
- Anger

Cognitive
- Information Overload
- Selective Attention
- Less Risky Choices

Timing
- Stress
- Under Pressure
- Maximum Speed

Automatic Action
- Routine
- Previous Experiences
- Behavioural Patterns
Simulations

- Automatic Actions
- Retarded Actions
- Freezing
Simulations

- Virtual Reality Simulations
- Table Top Simulations
- Real Size Simulations
Simulations

Building Block Approach
start with basic exercises that test specific aspects of preparedness and response, followed by progressively complex exercises requiring additional preparation time and resources.
Type of training
- Individual training
- Team training

XVR on Scene
Aim
- Interactive teaching
- Train & Exercise
- Evaluate
Virtual reality and live simulation: a comparison between two simulation tools for assessing mass casualty triage skills
Pier Luigi Ingrassia, Luca Ragazzoni, Luca Carenzo, Davide Colombo, Alba Ripoll Gallardo and Francesco Della Corte

Comparison of the improvement in triage accuracy and speed in both groups through the timeline. The upper line graph shows the increased triage accuracy in group A (●) and in group B (□) and the decreased time to complete triage in group A (★) and in group B (○) from day 1 to day 3. VR, virtual reality.
Virtual reality and live simulation: a comparison between two simulation tools for assessing mass casualty triage skills
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VR simulation, compared with live simulation, had equivalent ability in assessing MCT skills, in terms of triage accuracy, intervention correctness, and speed, of naive medical students using the START triage algorithm, and to detect improvements in the medical expertise after a 2-h lecture.
Comparison of the Sacco Triage Method Versus START Triage Using a Virtual Reality Scenario in Advance Care Paramedic Students

Trevor Nirmal Jain, MSM CD, MScDM, MD*; Luca Ragazzoni, MD†; Henrik Stryhn, MSc, Samuel J. Stratton, MPH, MD‡; Francesco Della Corte, MD§

Table 1. Patient parameters with known outcomes from a train accident in Chatsworth, Los Angeles, California, on September 12, 2008

<table>
<thead>
<tr>
<th>Victim ID</th>
<th>Sex</th>
<th>Age</th>
<th>Airway</th>
<th>RR</th>
<th>HR</th>
<th>CRT</th>
<th>Amb</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>M</td>
<td>19</td>
<td>Clear</td>
<td>16</td>
<td>110</td>
<td>&lt;2</td>
<td>Y</td>
<td>Released from ER with superficial abrasions</td>
</tr>
<tr>
<td>282</td>
<td>F</td>
<td>17</td>
<td>Clear</td>
<td>18</td>
<td>90</td>
<td>&gt;2</td>
<td>Y</td>
<td>Fractured wrist, reduced and casted, released</td>
</tr>
<tr>
<td>378</td>
<td>M</td>
<td>44</td>
<td>Clear</td>
<td>20</td>
<td>130</td>
<td>&gt;2</td>
<td>Y</td>
<td>Resuscitated with IV fluids, wound repair by plastics</td>
</tr>
<tr>
<td>388</td>
<td>M</td>
<td>60</td>
<td>Clear</td>
<td>18</td>
<td>130</td>
<td>&gt;2</td>
<td>N</td>
<td>Liver laceration, right hemorhorax, right tib/fib fracture, pelvic fracture, died day 3 of sepsis</td>
</tr>
<tr>
<td>412</td>
<td>F</td>
<td>27</td>
<td>Clear</td>
<td>24</td>
<td>130</td>
<td>&lt;2</td>
<td>Y</td>
<td>Deep lacerations, right eye globe rupture, lived with right vision loss</td>
</tr>
<tr>
<td>538</td>
<td>F</td>
<td>60</td>
<td>Clear</td>
<td>24</td>
<td>100</td>
<td>&lt;2</td>
<td>N</td>
<td>Taken to OR for reduction of hip dislocation, left ankle fracture reduction</td>
</tr>
<tr>
<td>784</td>
<td>M</td>
<td>57</td>
<td>Clear</td>
<td>12</td>
<td>45</td>
<td>&gt;2</td>
<td>N</td>
<td>Left initially by first responders, upon return found pulseless, pronounced dead in the field</td>
</tr>
<tr>
<td>803</td>
<td>M</td>
<td>23</td>
<td>Clear</td>
<td>22</td>
<td>110</td>
<td>&lt;2</td>
<td>Y</td>
<td>Traumatic pancreatitis, discharged one week later</td>
</tr>
<tr>
<td>864</td>
<td>F</td>
<td>32</td>
<td>Clear</td>
<td>26</td>
<td>110</td>
<td>&lt;2</td>
<td>N</td>
<td>Required mild sedation, released to family</td>
</tr>
<tr>
<td>911</td>
<td>F</td>
<td>32</td>
<td>Obstructed</td>
<td>12</td>
<td>140</td>
<td>&gt;2</td>
<td>N</td>
<td>Released from pinned position, suffered respiratory arrest, pronounced dead in the field</td>
</tr>
</tbody>
</table>

Figure 1. A screenshot of the virtual reality scenario environment with an example of Triage Card visualized during the simulation.
Virtual Reality Simulation Training for Ebola Deployment

Luca Ragazzoni, MD; Pier Luigi Ingrassia, MD, PhD; Lina Echeverri, MD; Fabio Maccapani, MD; Lizzy Berryman; Frederick M. Burkle, Jr, MD, MPH, DTM; Francesco Della Corte, MD

ABSTRACT

Both virtual and hybrid simulation training offer a realistic and effective educational framework and opportunity to provide virtual exposure to operational public health skills that are essential for infection control and Ebola treatment management. This training is designed to increase staff safety and create a safe and realistic environment where trainees can gain essential basic and advanced skills. (Disaster Med Public Health Preparedness. 2015;9:543-546)

Keywords: Ebola, professionalization, simulation, education and training
ISEE
The basis for ISEE is a representation of your region inside ISEE through GIS maps. On these maps, all active and storage locations where incident management staff, vehicles and materials are present are recreated. The realistic number of resources are positioned in every virtual location. The travel time module in ISEE simulates realistic distances and travel times.
ISEE
Aim

- Train & Exercise
  - Preparedness & Planning
  - Response
- Evaluate a response plan
Table Top
Real Size Simulation
Real Size Simulation
Real Size Simulation
Real Size Simulation
Table 4. Pre-hospital and hospital command-and-control

<table>
<thead>
<tr>
<th>Activity</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-hospital</td>
<td>Immediately</td>
</tr>
<tr>
<td>Tabard indicating medical and ambulance incident officer</td>
<td>Within 2 minutes</td>
</tr>
<tr>
<td>First report to dispatch center</td>
<td>METHANE</td>
</tr>
<tr>
<td>Correct content of first report: METHANE</td>
<td>Within 3 minutes</td>
</tr>
<tr>
<td>Formulate guidelines for response</td>
<td>Within 5 minutes</td>
</tr>
<tr>
<td>Establishing contact with strategic level of command and control</td>
<td>Within 5 minutes</td>
</tr>
<tr>
<td>Liaison with fire and police officers on the scene</td>
<td>Within 10 minutes</td>
</tr>
<tr>
<td>Second report to command &amp; control center</td>
<td>Indicate when First Patient will be evacuated</td>
</tr>
<tr>
<td>Correct content of second report: first patient evacuated</td>
<td>Within 10 minutes</td>
</tr>
<tr>
<td>Within 15 minutes</td>
<td>Within 30 minutes</td>
</tr>
<tr>
<td>Establishing level of medical ambition</td>
<td></td>
</tr>
<tr>
<td>First patient evacuated</td>
<td></td>
</tr>
<tr>
<td>Information to media on the scene</td>
<td></td>
</tr>
<tr>
<td>SUBTOTAL</td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
</tr>
<tr>
<td>Declaring a major incident</td>
<td>Within 1 minutes</td>
</tr>
<tr>
<td>Decide on level of preparedness for strategic management</td>
<td>Within 3 minutes</td>
</tr>
<tr>
<td>Establish contact with strategic management</td>
<td>Within 3 minutes</td>
</tr>
<tr>
<td>Assigning functions and positioning according to the plan</td>
<td>Within 5 minutes</td>
</tr>
<tr>
<td>Establishing level of medical ambition</td>
<td>Within 10 minutes</td>
</tr>
<tr>
<td>Establishing contact with the scene</td>
<td>Within 5 minutes</td>
</tr>
<tr>
<td>Staff briefing</td>
<td>Within 8 minutes</td>
</tr>
<tr>
<td>Content of staff briefing: situation report</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Assignments</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Summarizing</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Time of new staff briefing</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Information to press release</td>
<td>Within 30 minutes</td>
</tr>
<tr>
<td>Correct content of press release</td>
<td>Check First Report</td>
</tr>
</tbody>
</table>

Impact of training in medical disaster management: a pilot study using a new tool for live simulation

PIER LUIGI INGRASSIA¹, DAVIDE COLOMBO¹, FEDERICO LORENZO BARRA¹, LUCA CARENZO¹, JEFFREY FRANC², FRANCESCO DELLA CORTE¹

¹CRIMEDIM Research Center in Disaster and Emergency Medicine, Department of Translational Medicine, Università del Piemonte Orientale “A. Avogadro”, Novara, Italy. ²University of Alberta, Edmonton, Canada.
ADULT Learning

- Adults prefer to learn by doing
- Debriefing is the key of experiential adult learning
- Objective debriefing makes the learning more effective and efficient
Innovative approaches to 
Emergency and Disaster Medicine Education
Innovative approaches to Emergency and Disaster Medicine Education

- The use of state-of-the-art technologies in both traditional and non-traditional manners
Innovative approaches to Emergency and Disaster Medicine Education

- The use of state-of-the-art technologies in both traditional and non-traditional manners

- Applying different educational methodologies into the same educational programs to enhance students' understanding and learning through meaningful experience
Innovative approaches to Emergency and Disaster Medicine Education

- The use of state-of-the-art technologies in both traditional and non-traditional manners

- Applying different educational methodologies into the same educational programs to enhance students' understanding and learning through meaningful experience

- Ongoing process to re-define the learning objectives and to adapt technologies and methodologies accordingly
The Art of Innovation

TEDx

By Guy Kawasaki
The Art of Innovation

By Guy Kawasaki

- Make meaning → desire to change the world
- “Jump curves” concept → evolution, curiosity, creativity
- Let 100 flowers blossom → people as resources
Thanks!

Any questions?

You can find me at
- marta.caviglia@med.uniupo.it
WORKSHOP

E-LEARNING

PAL

TABLE TOP

VIRTUAL REALITY

REAL SIZE